



**Descriptive Analysis of Medical Attrition
in U.S. Army Aviation
(Reprint)**

By

**Ronald R. Edwards
and
Dudley R. Price**

Biomedical Applications Division

September 1989

Approved for public release; distribution unlimited.

**United States Army Aeromedical Research Laboratory
Fort Rucker, Alabama 36362-5292**

Notice

Qualified requesters

Qualified requesters may obtain copies from the Defense Technical Information Center (DTIC), Cameron Station, Alexandria, Virginia 22314. Orders will be expedited if placed through the librarian or other person designated to request documents from DTIC.

Change of address

Organizations receiving reports from the U.S. Army Aeromedical Research Laboratory on automatic mailing lists should confirm correct address when corresponding about laboratory reports.

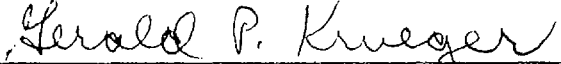
Disposition


Destroy this document when it is no longer needed. Do not return it to the originator.

Disclaimer

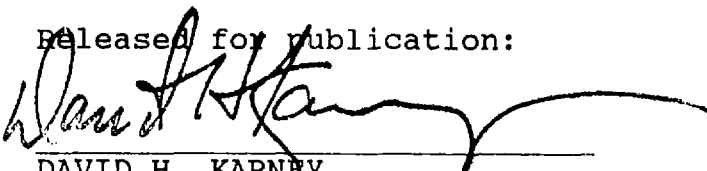
The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other official documentation. Citation of trade names in this report does not constitute an official Department of the Army endorsement or approval of the use of such commercial items.

Reviewed:


GERALD P. KRUEGER, Ph.D.,
LTC, MS
Director, Biomedical Application
Research Division


J. D. LaMOTHE, Ph.D.
COL, MS
Chairman, Scientific
Review Committee

Released for publication:


DAVID H. KARNEY
Colonel, MC
Commanding

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION/AVAILABILITY OF REPORT Public release; distribution unlimited		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) USAARL Report 89-29			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION U.S. Army Aeromedical Research Laboratory		6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) P.O. Box 577 Fort Rucker, Alabama 36362-5292			7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION		8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code)			10. SOURCE OF FUNDING NUMBERS		
		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) (U) Descriptive analysis of medical attrition in U.S. Army aviation					
12. PERSONAL AUTHOR(S) Ronald J. Edwards, Dudley R. Price					
13a. TYPE OF REPORT Technical		13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 89/08		15. PAGE COUNT 12
16. SUPPLEMENTARY NOTATION Originally published in <u>Aviation, Space & Environmental Medicine</u> , 1989; 60(7 Suppl):A92-7					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	Aviator health, flight physicals, medical retention of aviators		
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
<p>Although U. S. Army aviators are carefully screened at entry, disease develops in the aviator population with time. Improving the ability to predict and prevent such diseases necessitates proper analysis of their incidence. This information can provide the basis for future improvements in screening and prevention. A descriptive analysis of diseases for the u. S. Army aviation population is presented. The frequency of International Classification of Diseases (ICD) codes leading to disqualification from flying status is summarized and discussed. Suggestions for future screening criteria and for intervention practices are proposed.</p>					
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a. NAME OF RESPONSIBLE INDIVIDUAL Chief, Scientific Information Center			22b. TELEPHONE (Include Area Code) (205) 255-6907		22c. OFFICE SYMBOL SGRD-UAX-SI

Descriptive Analysis of Medical Attrition in U.S. Army Aviation

RONALD J. EDWARDS, M.D., and DUDLEY R. PRICE, M.D.

EDWARDS RJ, PRICE DR. *Descriptive analysis of medical attrition in U.S. Army aviation.* Aviat. Space Environ. Med. 1989; 60(7, Suppl.):A92-7.

Although U.S. Army aviators are carefully screened at entry, disease develops in the aviator population with time. Improving the ability to predict and prevent such diseases necessitates proper analysis of their incidence. This information can provide the basis for future improvements in screening and prevention. A descriptive analysis of diseases for the U.S. Army aviation population is presented. The frequency of International Classification of Diseases (ICD) codes leading to disqualification from flying status is summarized and discussed. Suggestions for future screening criteria and for intervention practices are proposed.

THE UNITED STATES Army maintains a force of 10,000-20,000 pilots and requires that they be healthy, ready, and able to perform their expected defense missions. This requires that both selection and retention standards for physical condition of the pilots be such that aviation training investments will produce quality and long-term aviators who are not lost to aviation by reason of medical disease. An examination of the historic experience of the Army's losses of aviators makes possible the application of corrective future efforts in areas of selection standards, retention standards, effective medical treatment, and waiver policy standards. This study is such an examination of the Army's experience in medical losses to aviation from January 1981 to June 1986.

The Army uses the International Code of Diseases, version 9CM (ICD9CM), to refer to specific disease states, and includes these codes in the automated storage of aviator records. When an aviator applies to the Aviation Branch for training as an aircrew member or air traffic controller, he or she is required to pass an extensive physical examination initially and on a regular (usually annual) basis. If the applicant is found to have a disqualifying condition or history on initial exam at Fort Rucker, he/she is classified as "medically

eliminated" (ME). If he/she passes initial physical exams and becomes qualified as an aviator, but subsequently develops a disqualifying condition, he/she is classified as being "disqualified" (DQ), and then as being "suspended" (SG) if the disqualifying condition does not resolve within the allotted period or if it is clear by the nature of the disease that its process is irreversible. Some members of the DQ group are later included in the SG group and are counted twice (usually the designation is changed to SG instead of adding a new record with an SG designation to the file). ME and SG generally represent a permanent loss to Army aviation. The present analysis looks at the ME and SG classifications as the parameters for permanent loss to aviation service; some analyses also use the DQ category in an attempt to give a complete picture of all the medical reasons personnel are excluded from aviation service. The data presented DO NOT represent those aviators who have been granted a waiver to fly with a potentially disqualifying condition, a tool used to manage the gray-zone cases that need individual attention.

Although the absolute numbers of trained pilots lost to aviation each year is small relative to the number of the total pilot force, and relative to the total number of aviators examined each year (72 of 7,574 applicants were medically eliminated in 1984, a rate of 1%; 190 suspensions were issued in 1984 with a pilot force of 10,000-15,000, a rate of approximately 1.5%), each loss to the aviation sector represents a minimum dollar investment of \$325,000 spent to train the aviator just to the completion of initial entry flight training. The 190 aviators lost in 1984 represented \$62 million spent on training, now not usable. Adding the non-pilot personnel lost to aviation duty due to disease raises these numbers greatly. Because man is mortal and disease exists, some of these losses are inevitable, but selecting candidates least likely to develop problems, developing methods for ongoing screening and early detection, and pursuing health promotion (prevention) and effective treatment can decrease the impact of disease on the work force.

The data files on aviators are gathered worldwide and sent to Fort Rucker, AL, where the Army Aeromedical

From Eisenhower Medical Center, Augusta, GA, and U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL.

Send reprint requests to Ronald J. Edwards, M.D., Chief of Preventive Medicine, Eisenhower Medical Center, Augusta, GA 30905.

ARMY AVIATION MEDICAL ATTRITION—EDWARDS & PRICE

Activity (AAMA) resides and where the records are reviewed, classified, and stored. Electronic storage uses a Digital VAX mainframe computer at the Army Aeromedical Research Laboratory (USSARL) at Fort Rucker as part of the Aviation Epidemiologic Data Register.

METHODS

The Waiver and Suspense file (WSF) described above was searched for all 1981–85 records with a designation of DQ, ME, or SG. The entire file contains the records of approximately 20,000 aviators. Records were selected for inclusion in the analysis only if a diagnosis was indicated in the first of five fields available for diagnostic codes, as the convention is to use this first column as the repository for the code for which the suspension, etc., is granted. The categories were further subdivided using both the group that was fully trained as aviators, then subsequently lost to aviation through development or discovery of an SG, and the group that was considered for training but rejected because of an ME.

The disease categories were evaluated both from a broad perspective (i.e. cardiology problems, orthopedic problems, etc.) and from a more specific perspective by disease name (i.e. myocardial infarction, compression fracture of lumbar spine, etc.). Frequency counts and percentages were developed and comparisons made between the Army aviator overall population distributions. Data analysis used SPSS statistical software (frequencies and crosstabs subroutines) run on the VAX computer.

The expected values used in analysis were determined by calculating the frequency distribution of the substrata (i.e. males = 98.8%, etc.) in the overall Army aviation population, and applying those frequencies to the number of cases of a specific disease actually observed, to determine the number of cases expected in those strata. In diseases with known age-dependent distribution (e.g. myocardial infarction), this method does not completely adjust the expected rate to the known age distribution pattern.

Several diagnostic categories require explanation. The term "administrative" elimination refers to non-medical causes, such as academic failures and legal problems. The term "symptoms" is used as a catchall for symptoms that are significant but could not be or had not yet been attached to a specific diagnosis at the time of disposition (i.e. pain, nausea, speech disturbance, etc.). ARMA means "adaptability rating for military aeronautics," and is treated as an indicator of psychological appropriateness and soundness. Sick cell trait was treated in the past as disqualifying for certain aviation roles, but has since been classified as non-disqualifying; most of the records showing suspensions under this diagnosis have been returned to a qualified status since 1985. MOS means military occupational specialty and identifies the specific job a service member is trained to do. Finally, failing the RLT (red lens test) indicates a visual problem with disconjugate gaze (phorias).

Flying duty medical exams (FDME) are also required

of personnel, other than pilots, who deal with the aviation operation, such as the air traffic controller, the crew chief (attends to the aircraft nonpiloting duties), flight surgeon (physician with aviation orientation who cares for aviation personnel), flight medic, etc. The designators for these categories are shown in Table I.

RESULTS

All Classes of FDMEs

The search of the WSF for those records containing a diagnosis and having a category designation of DQ, ME, or SG returned a total of 1,995 records for 1981–85 inclusive. The disposition of these 1,995 cases was: ME = 502 (25.2%), DQ = 254 (12.7%), and SG = 1,239 (62.1%). They are also described in Table II by sex, race, age, component, rank, and classification of physical exam type.

Note the stratified variations in expected and observed values in Table II, in which the expected numbers are derived from application of the population distribution percentage for that strata (i.e., male or age 26–30, etc.) for the entire Army aviation population. Significance levels are calculated using a Yates corrected Chi-square statistic.

In summary, the following groups are medical losses to aviation at a significantly higher rate than expected. Higher rates of loss are expected here as this is the first time these Warrant Officer Candidates are examined by the military aviation medicine system.

Sex:	females
Race:	blacks
Age:	<25 years, >46 years
Component:	active duty, civilian
Rank:	E1, E2, E3, E4, E5, O6
Class of exam:	Class I

The following groups are disqualified at a significantly lower rate than expected:

Age:	36–45 years
Component:	National Guard, Reserve
Rank:	W2, O1, O2, O3, O4
Class of exam:	Class II, IIa

Table III shows the broad categories of diseases by count and percentage. Over 50% of the reasons for exclusion from aviation service (both initial rejection and subsequent elimination) fall into the broad categories of (in descending order) cardiac, ophthalmologic, sub-

TABLE I. DEFINITIONS OF FLYING DUTY MEDICAL EXAM CLASSES.

Class I:	incoming Warrant Officer Aviator Candidates
Class I-A:	incoming Commissioned Officer Aviator Candidates
Class II:	routine annual exam on rated aviators
Class II-A:	alternate year, shortened version of Class II
Class II-F:	annual exam for flight surgeons
Class II-I:	initial exam for aviators rated by other services
Class II-M:	annual exam for aeromedical physician assistants
Class II-P:	annual exam for air traffic controllers
Class III:	annual exam for other (non-pilot) aircrew
Class III-C:	annual exam for aeroscout observer, etc.

ARMY AVIATION MEDICAL ATTRITION—EDWARDS & PRICE

TABLE II. MEDICAL LOSSES OF ALL FLYING PERSONNEL: OBSERVED VS. EXPECTED OF MAJOR VARIABLES (ALL CLASSES OF FDME; INCLUDES ME, DQ, SG).

		No. of Losses	Percent Observed	Percent Expected	
Sex:	Male	1686	93.3	98.8	NS
	Female	122	6.7	1.2	<0.001
Race:	Caucasian	1568	92.9	96.6	NS
	Black	120	7.1	2.9	<0.001
	Other	0	0	—	—
Age:	<20 yr	65	3.8	1.2	<0.001
	21-25	345	20.0	12.2	<0.001
	26-30	354	20.1	21.4	NS
	31-35	319	18.5	16.8	NS
	36-40	286	16.6	29.4	<0.001
	41-45	185	10.7	14.1	<0.001
	46-50	95	5.5	3.9	<0.001
	>50	73	4.2	0.9	<0.001
Component:	Active Duty	1579	79.1	65.7	<0.001
	Natnl. Guard	184	9.2	22.4	<0.001
	Reserve	146	7.3	9.7	<0.001
	R.O.T.C.	19	1.0	—	—
	Civilian*	65	3.2	2.0	<0.001
Rank:	E1	16	0.8	0.4	<0.001
	E2	33	1.7	0.2	<0.001
	E3	39	2.0	1.0	<0.001
	E4	105	5.3	0.9	<0.001
	E5	482	24.2	4.0	<0.001
	W1	95	4.8	5.5	NS
	W2	213	10.7	17.4	<0.001
	W3	218	10.9	10.5	NS
	W4	95	4.8	7.8	<0.001
	O1	70	3.5	7.9	<0.001
	O2	63	3.2	6.8	<0.001
	O3	150	7.5	17.0	<0.001
	O4	118	5.9	11.6	<0.001
	O5	106	5.3	4.8	NS
	O6	35	1.7	0.9	<0.001
	O7	0	0	0	NS
Class of exam:**	Civilian*	87	—	—	—
	I	264	13.2	5.6	<0.001
	I-A	93	4.7	4.3	NS
	II	1297	65.0	75.1	<0.001
	II-A	31	1.6	7.3	<0.001
	II-F	11	0.6	—	—
	II-I	19	0.9	—	—
	II-M	1	0.1	—	—
	II-P	259	13.0	—	—
	III	2	0.1	—	—
	III-C	11	0.6	—	—

(*) The designation "civilian" describes the civilian contract pilots utilized as instructors, test pilots, etc.

(**) See Table I for Class definitions.

stance abuse, psychiatric, and orthopedic. These data show that 41% and 43% of the diseases in the two groups presented in Table III are diseases closely related to lifestyle and personal behavior (cardiac, substance abuse, orthopedic, and psychiatric), suggesting preventive medical interventions as a viable means of impacting attrition.

Table IV lists in descending order the frequency of elimination from flying duty of any aviation personnel (pilots and all other aircrew, air traffic controllers, etc.) in all categories of disposition—those medically eliminated before or during flight training (ME), those suspended after full aviator qualification (SG), and those disqualified but with the possibility of being reinstated (DQ). By comparing Table IV and V, an appreciation of

the more global effects of a disease may be contrasted to the specific loss of pilot manpower (Table V). The 1,174 aviation personnel below are grouped by their class of FDME (and respective flying duties): Class I: 14.3%; Class IA: 4.8%; Class II: 59.8%; Class IIA: 1.4%; Class IIP: 16.6% (air traffic control); all others: 3.8%.

Again of special interest is the indication that intervention can play a major role in decreasing losses to aviation. Cannabis use, alcohol abuse, high blood pressure, obesity, coronary artery disease, myocardial infarction, stress management problems, low back pain, change in MOS, and depression are all diseases of lifestyle and behavior and can be changed. Hearing loss is an additional hazard that the environment presents and is one that can be managed and often prevented.

ARMY AVIATION MEDICAL ATTRITION—EDWARDS & PRICE

TABLE III. CATEGORIES AND SUSPENSIONS.

All Categories of Disposition (DQ, ME, SG)		Suspensions (SG) (Rated aviators)	
#	%	#	%
Cardiac	230 11.5	Cardiac	189 14.8
Ophthalmolog	227 11.4	Substance abuse	154 12.0
Substance abuse	202 10.1	Administrative	127 9.9
Psychiatry	191 9.6	Orthopedic	106 8.3
Orthopedic	185 9.3	Psychiatric	104 8.1
Administrative	166 8.3	Endoc/metab	62 5.5
Otologic	117 5.9	Ophthalmolog	62 5.5
Neuro(cent)	83 4.2	Neuro(cent)	62 5.5
Endocr/metab	71 3.6	Gastrointest	52 4.1
Gastrointes	65 3.4	Otologic	48 3.7
Symptoms	67 3.4	Gynecol/OB	38 3.0
Gynecol/OB	42 4.1	Symptoms	36 2.8
Pulmonary	39 2.2	Neoplasm	34 2.7
Neoplasm	34 1.8	Pulmonary	29 2.3
Renal	31 1.6	Renal	26 2.0
Fract/disloc	32 1.6	Trauma	23 1.9
Trauma	27 1.4	Fract/disloc	20 1.6
Accidents	25 1.3	Other*	1183 95.5
Other*	1834 91.9		

* Less than 1%; ENT, vascular, neurologic (peripheral), dermatologic, infectious, environmental, urologic, congenital.

Note: missing data accounts for the remaining percentage.

Suspensions of Rated Aviators

Table V lists the causes for suspension since 1980 of rated aviators by disease name. These 494 aviators represent 41.8% of all the suspensions of aviation personnel (aviators, aircrew, air traffic controllers, etc.) and represent 26.9% of all eliminations (DQ, ME, SG) for the same time period (Table IV).

Perhaps the increased average age of the Class II aviation personnel compared to the younger Class I group and the often younger air traffic controller is the reason

that high blood pressure heads the Class II list, and cannabis use is significantly lower in this group (recent Department of Defense anti-drug policy has significantly decreased cannabis use as a problem in military organizations, but is reflected only in the most recent data). Stress may be an active ingredient here as well, but alcohol abuse remains about the same compared to Table IV results. Attrition due to pregnancy increases as female aviation personnel turn their attention to child bearing.

Table VI presents suspension data for Class II and II-A (rated aviators) by the variables sex, class of physical component, race, and age. Overall observed and expected figures are shown and compared. The expected rates have been calculated by applying the overall distribution frequencies of Army aviators to the number of cases of a specific disease observed.

In summary, the following groups are disqualified at a significantly higher rate than expected:

Sex: female
Age: ≥41 years
Component: Reserves

The following groups are disqualified at a significantly lower rate than expected:

Age: 21–30 years
Component: National Guard
Class of exam: II-A

In Table VII, due to the small number of females, expected numbers were often less than 1 and tests of significance were not possible. Compression fracture is the only disease among females where more than the number of expecteds were observed (2 females and 5 males with this diagnosis). The same is true with Class (too few expecteds in the cells for II-A).

For the age variable, a linear relationship exists (the exceptions are noted below) such that as age increases,

TABLE IV. SPECIFIC DISEASE SOURCES ELIMINATING AVIATION PERSONNEL (ALL CLASSES OF FLYING DUTY; ME, DQ, SG).

Percent	No.		Percent	No.	
10.0	117	Cannabis use	1.7	20	Underweight
6.0	70	Auditory acuity	1.6	19	Diabetes mellitus
5.9	69	Alcohol abuse	1.5	18	Depression
5.5	65	High blood pressure	1.4	16	Chondromalacia patella
4.4	52	Sickle cell trait	1.4	17	Kidney neoplasm
3.5	41	Obesity	1.2	14	Vertigo
3.4	40	Coronary artery disease	1.1	13	Compression fracture
3.3	39	Normal pregnancy	1.1	13	Esophageal achalasia
3.2	37	Abnormal stress react'n	1.0	12	Visual acuity uncorr
3.0	34	Low back pain	0.9	11	Migraine, classic
2.7	32	Change MOS	0.9	11	Anxiety state
2.7	32	Myocardial infarction	0.8	9	Phobia
2.6	30	Far visual acuity defect	0.7	8	Migraine, unspecified
2.6	31	Unsat ARMA	0.7	8	Asthma, extrinsic
2.6	30	Adjustment reaction	0.7	8	Drug dependence
2.2	26	Lost records	0.7	8	Mitral valve prolapse
2.2	26	Admin termination	0.6	7	Near viz acuity defect
2.1	25	Civilian	0.5	6	Asthma, intrinsic
2.0	24	Accommodative defect	0.5	6	Chronic sinusitis
2.0	24	Fail RLT	0.5	6	Depth perception
1.8	21	Syncope	0.2	2	Brain neoplasm
1.8	21	Allergic rhinitis	0.2	2	Crohn's disease
1.8	21	Defective color vision			
1.8	21	Herniated disc			
				1174	

ARMY AVIATION MEDICAL ATTRITION—EDWARDS & PRICE

TABLE V. SPECIFIC DISEASES SUSPENDING RATED AVIATORS (SG; CLASS II AND II-A).

Percent	No.		Percent	No.	
11.3	56	High blood pressure	1.6	8	Adjustment reaction
6.9	34	Coronary artery disease	1.6	8	Vertigo
6.9	33	Alcohol abuse	1.2	6	Anxiety state
5.9	29	Normal pregnancy	1.0	5	Asthma, intrinsic
5.7	28	Myocardial infarction	1.0	5	Asthma, extrinsic
5.7	28	Obesity	0.8	4	Migraine, unspecified
5.3	26	Admin termination	0.8	4	Crohn's disease
4.5	22	Auditory acuity	0.8	4	Allergic rhinitis
3.6	18	Cannabis use	0.8	4	Abnormal stress reaction
3.4	17	Herniated disc	0.8	4	Demyelinate CNS disease
3.4	17	Diabetes mellitus	0.6	3	Far viz acuity defect
3.2	16	Neoplasm kidney	0.6	3	Change MOS
3.2	16	Lost records	0.6	3	Near vision acuity defect
3.2	16	Low back pain	0.6	3	Phobia
2.2	11	Esophageal achalasia	0.4	2	Chondromalacia patella
1.8	9	Civilian	0.4	2	Extraocular move defect
1.8	9	Syncope	0.4	2	Accommodative defect
1.8	9	Compression fracture	0.4	2	Mitral valve prolapse
1.6	8	Migraine, classic	0.4	2	Chronic sinusitis
1.6	8	Unsat ARMA	0.2	1	Brain neoplasm
1.6	8	Depression	0.2	1	Visual acuity uncorr.
			494		

the ratio of expected: observed grows steadily larger. For cannabis use, this ratio grows larger with age (fewer older personnel than expected use cannabis).

For esophageal achalasia, coronary artery disease, myocardial infarct, high blood pressure, hearing loss, and obesity, the ratio grows smaller with age (more older personnel than expected have the diseases).

Isolated age groups where disease is found more often than expected (indicated in parenthesis) are seen in herniated disc (31–45 years), migraine (31–35 years); alcohol abuse (31–40 years), syncope (31–35 years) and low back pain (36–45 years).

Medical Eliminations Before Pilot Qualification

Aviation candidates who pass the initial medical screening gate may subsequently develop or be found to have a medical condition that eliminates him/her from continuing in flight training. This represents less of a personal loss to the candidate and less of a financial and resource loss to the Army than when a disease is discovered after time and money are invested. It also gives a different cross-sectional view of the kind of pathology that excludes this group from the potential candidate pool.

It is obvious from Table VIII that the majority of those aspiring aviators turned away for medical reasons before training completion are eliminated because of hearing and vision problems. Psychological makeup (abnormal stress reaction, unsatisfactory ARMA, cannabis use, adjustment reaction, alcohol abuse, phobias, and anxiety states) account for another 27% of eliminations. These problems are probably not cost-effective to alter, even if intervention can be effected.

SUMMARY

Of all aviation applicants who progressed far enough into the application cycle to have a flying duty medical exam during the period 1981–85, approximately 1% per

year were medically eliminated at the earliest stages of involvement. Of those rated as aviators, an additional 1.5% per year were subsequently suspended from aviation duty for medical reasons.

There were more females eliminated than statistically expected when viewing aviation personnel overall and when viewing pilots specifically. Pregnancy accounted for about one-third of these losses.

Considering race, blacks are lost to aviation for medical reasons more often than expected; the only disease that stands out statistically among blacks is high blood pressure.

The variables age and rank both show that the younger ages and the lower ranks have fewer attritions than expected and the older and higher ranks have more

TABLE VI. SUSPENSIONS OF RATED AVIATORS (ALL DISEASES): EXPECTED VS. OBSERVED.

		Percent Expected	Percent Observed	p
Overall diseases:				
Sex:	Male	98.8	92.1	NS
	Female	1.2	7.8	<0.001
Class:	II	91.1	97.0	NS
	II-A	8.9	3.0	<0.001
Component:	Active duty	65.7	70.7	NS
	National Guard	22.4	13.6	<0.001
	Reserve	9.7	12.9	NS
	Civilian	2.0	2.8	NS
Race:	Caucasian	96.6	98.3	NS
	Black	2.9	1.7	NS
Age:	<20 years	1.2	0.4	NS
	21–25	12.2	6.5	<0.001
	26–30	21.4	13.3	<0.001
	31–35	16.8	19.2	NS
	36–40	29.4	26.7	NS
	41–45	14.1	19.0	<0.005
	46–50	3.9	8.5	<0.001
	>50	0.9	6.5	<0.001

ARMY AVIATION MEDICAL ATTRITION—EDWARDS & PRICE

TABLE VII. SUSPENSIONS OF RATED AVIATORS (SPECIFIC DISEASES): EXPECTED VS. OBSERVED.

Disease**	Component	
	More than expected	Less than expected
Normal pregnancy	Reserves (p < 0.05)	
Kidney neoplasm	National Guard (5/3.5)*	
High blood press	Reserves (9/6)*	
Cannabis use	Active duty (19/15)*	National Guard (3/5.2) Reserves (1/2.5)*
Diabetes	Reserves (p < 0.001)	National Guard (1/3.8)*
Syncope	Reserves (3/1)*	
Other diseases are as expected		
Race: High blood press.	Black (3/1.7)*	

* Because of the small numbers of cases in these strata, tests of significance are not valid, but the observed/expected counts are presented here to show the trends.

** Diseases not mentioned above are as expected; National Guard units are not screened nearly as often as others for cannabis use, lowering their reported case rate.

attritions than expected among the pilot group; when all aviation-related personnel are considered there is a loss (greater in the under 25- and over 45-year ranges).

Component of service shows that in all aviation duties, the active duty component loses more than expected due to medical reasons, but that the pilot subgroup on active duty loses only the number expected. The National Guard, in both the pilot subgroup and the overall categories, loses fewer than expected, while Reserves lose more pilots than expected.

Consideration of the class of physical exam shows a greater-than-expected rate for the Class I exams; these are the newcomers, and it is reasonable to find that there are new and undiscovered medical problems that surface early in their medical examination period. The Class IA exams are done on personnel already in the military, and often already in an aviation-related field; they have been medically investigated previously, and thus the expected attrition is found when doing these exams. The Class IIA requirements are not as rigorous and do not examine in nearly the detail that Class I and II exams do; consequently, less than the expected number of eliminations are found in this group of exams.

The Class II physical produces the expected number of eliminations in the pilot subgroup.

Finally, the specific diseases that lead to elimination of aviators are predominantly diseases that are lifestyle-dependent (high blood pressure, coronary artery disease, alcohol abuse, pregnancy, myocardial infarction, obesity, cannabis use), and health intervention is suggested as a primary interventional-preventive mode. Many diseases related to psychological and psychiatric problems also appear on the list of attrition causes. When considering all classes of aviation duty, the frequency with which cannabis use and alcohol abuse appear as causes of attrition is notable.

Of the causes of medical attrition potentially creating sudden incapacitation, coronary artery disease, alcohol abuse, diabetes mellitus, syncope, migraine, vertigo, and asthma appear in that order of frequency.

These data can provide guidelines for applying resources to initial screening of aviation applicants, subsequent follow-up of health problems of particular subgroups, and interventional modes of preventing certain medical problems from causing pilot and aircrew disability and loss of their skills and training to aviation.

TABLE VIII. SOURCES OF MEDICAL ELIMINATION (ME) FROM FLIGHT TRAINING.

Percent	No.		Percent	No.	
14.6	39	Auditory acuity			
8.6	23	RLT failure	1.1	3	Herniated disc
7.8	21	Distant vision defect	1.1	3	Obesity
7.5	20	Cannabis use	0.8	2	Normal pregnancy
7.5	20	Abnormal stress reaction	0.8	2	Chronic sinusitis
6.7	18	Accommodative defect	0.8	2	Mitral valve prolapse
4.5	12	Low back pain	0.8	2	Anxiety state
4.1	11	Visual acuity uncorr.	0.8	2	High blood pressure
3.7	10	Color vision defect	0.8	2	Depression
3.4	9	Unsat ARMA	0.4	1	Diabetes mellitus
3.4	9	Adjustment reaction	0.4	1	Esophageal achalasia
3.4	9	Chondromalacia patella	0.4	1	Compression fracture
3.0	8	Syncope	0.4	1	Sickle cell trait
3.0	8	Alcohol abuse	0.4	1	Crohn's disease
2.2	6	Allergic rhinitis	0.4	1	Admin termination
2.2	6	Depth percept defect	0.4	1	Civilian
1.5	4	Phobia	0.4	1	Near vision defect
1.5	4	Migraine, unspecified	0.4	1	Asthma, extrinsic
1.5	4	Vertigo		268	